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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

ROBERT J. BUTLER
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April 7, 1994

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William F. Caton
Acting Secretary
Federal Communications Commission
Room 222
1919 M Street, N.W.
Washington, D.C. 20006

Re: GEN Docket 90-314

Dear Mr. Caton:

I am writing to advise you that Sandy Abramsom, Ron Cross, Steve Sivitz, Peter Murray, Richard E. Wiley and R. Michael Senkowski met on Wednesday, April 6, 1994 with James H. Quello, Robert M. Pepper, Ralph A. Haller, Thomas P. Stanley, Donald H. Gips, Byron F. Marchant, and Chairman Reed M. Hunt on behalf of UTAM, Inc. to discuss issues raised in the enclosed materials. A copy of these materials was left with the staff members, the Commissioner, and the Chairman.

Very truly yours,


Robert J. Butler

RJB/cjs

UTAM PROGRESS REPORT FOR UNLICENSED PCS

UTAM's Membership and Goals. UTAM is a non-profit corporation formed by Unlicensed PCS manufacturers. Voting membership is open to any manufacturer intending to sell products for use in the spectrum allocated for Unlicensed PCS. Non-voting members include representatives of microwave licensees and other potentially affected industries. UTAM's members represent the full range of future providers of data and voice Unlicensed PCS products. Its goal is the fastest practicable relocation of all microwave links from Unlicensed PCS spectrum. A list of current members and the UTAM Board of Trustees members is attached.

UTAM's Responsibilities for Unlicensed PCS. The FCC has designated UTAM as frequency coordinator for Unlicensed PCS, conditioned upon submission of an acceptable plan for funding and relocating incumbent 2 GHz microwave licensees from spectrum allocated for Unlicensed PCS. UTAM's responsibilities under the FCC rules include developing a mechanism, based on the Second Report and Order, for funding the \$300 - \$500 million in microwave relocation costs, establishing a plan for relocating microwave links and serving as frequency coordinator to ensure that Unlicensed PCS systems and devices deployed prior to full relocation of all microwave links in the Unlicensed PCS spectrum do not cause interference to microwave licensees. UTAM was established because no existing organization was willing or able to assume these responsibilities.

Unlicensed PCS and Its Public Benefits. Unlicensed PCS is a family of data and voice systems or devices that consumers own or lease to meet their telecommunications needs. Unlicensed PCS includes wireless local area networks, wireless PBXs, advanced cordless phones, personal digital assistants, devices for linking laptop and desktop computers and two-way telemetry. Unlike licensed PCS, there is no need for a service provider, no air time charges and products will be available anywhere in the country once band clearing has occurred. End users can easily purchase and use devices without cumbersome licensing procedures. This will permit a broad range of important business, consumer, education and health applications for the office, home, classroom and hospital. With finalization of FCC rules, U.S. manufacturers can continue global leadership in the unlicensed telecommunications industry - a field which can play an important role in meeting the needs of less developed countries.

Challenges Facing UTAM In Developing a Funding and Relocation Plan. UTAM is developing a responsible funding plan that raises \$300 - \$500 million from a combination of membership payments, voluntary "seed money" contributions and clearing fees from sales of equipment. A critical component of relocation and revenue raising is the ability to deploy "coordinatable" products prior to full band clearing. UTAM is developing equitable and practical priorities for relocating microwave links from the Unlicensed PCS spectrum and a system for permitting the deployment of coordinatable Unlicensed PCS systems and devices prior to relocation of all microwave licensees. This work is being done on a consensus basis with participation open to

competing manufacturers as well as microwave interests. Once completed, the plan will be submitted to the FCC for public comment and Commission approval.

Progress Report on UTAM's Plan. Based upon the Second Report and Order, members of UTAM have already contributed over \$1 million dollars and thousands of hours of effort. UTAM has received pledges for voluntary contributions in excess of \$6 million that are absolutely essential to fund initial band clearing efforts. Goldman Sachs has been retained for financial advice, Business Information Strategies for demand studies, and Comsearch for database services. Laboratory and on-site studies of microwave interference and coordination techniques have been conducted. A draft of the plan for funding and relocating microwave licensees from the Unlicensed PCS spectrum is currently being drafted.

FCC Actions to Facilitate Unlicensed PCS. The FCC's spectrum allocation Order last fall set a sound framework for meeting Unlicensed PCS needs. The Commission could facilitate efforts to make Unlicensed PCS a reality by promptly reaffirming those actions. In such respects, four points must be emphasized:

- The current allocation of at least 40 MHz of spectrum is critical to meet consumer needs for Unlicensed PCS. The record before the Commission confirms the enormous demand for unlicensed PCS.
- The current allocation of 1890 - 1930 MHz for Unlicensed PCS remains crucial to the economic feasibility of the industry because the costs of nationwide banding clearing of microwave facilities is prohibitively expensive in any other Emerging Technologies frequencies. For example, the current allocation has roughly 2,000 links which will cost \$300 to \$500 million to relocate, while frequencies at 2100 MHz have over 7,000 microwave links which will cost \$1.05 to \$1.75 billion to relocate
- The current equal division of the extremely lightly populated 1910 - 1930 MHz between asynchronous (mostly data) and isochronous (mostly voice) products is essential to afford meaningful spectrum opportunities for both types of products as well as to secure the funding to clear microwave links from the entire Unlicensed PCS spectrum.
- The Commission should establish expedited procedures for reviewing and approving UTAM's plan for funding and relocating microwave links from the Unlicensed PCS spectrum.

These four simple steps can resolve uncertainties and facilitate the fastest possible deployment of a broad family of new Unlicensed PCS systems and devices. Tens of millions of dollars and hundreds of thousands of hours of industry effort have already been spent in developing products based upon the current allocation. Any changes at this late date would either delay or jeopardize the future of unlicensed PCS.

WHAT IS UTAM?

- UTAM is a non-profit corporation open to all companies and organizations concerned about Unlicensed PCS.
- UTAM members include companies interested in the full range of Unlicensed PCS voice and data products.
- UTAM has been charged with a number of important responsibilities as the FCC's conditionally designated frequency coordinator for the unlicensed PCS industry:
 1. Develop a plan for funding the relocation of microwave links from spectrum allocated for Unlicensed PCS.
 2. Develop and implement a plan for relocating microwave links from spectrum allocated for Unlicensed PCS.
 3. Serve as frequency coordinator for Unlicensed PCS deployments until all microwave links are relocated from spectrum allocated for Unlicensed PCS.
 4. Develop a plan for ensuring the fastest practicable deployment of "nomadic" or "non-coordinatable" Unlicensed PCS systems or devices, particularly data PCS systems or devices.
- UTAM's current membership is set forth in Attachment 1.

WHY WAS UTAM CONDITIONALLY DESIGNATED AS FREQUENCY COORDINATOR FOR UNLICENSED PCS?

- Unlike in the licensed PCS industry, there was no one company with exclusive rights to the spectrum and the obligation to move the microwave links - a mechanism was needed to collect funds and undertake the microwave relocation on behalf of the entire industry. UTAM formed for this purpose. No other organization or company was willing to accept this responsibility.
- As off the shelf consumer products, many unlicensed PCS systems and devices need clear spectrum in which to operate. Some 2000 microwave links in the unlicensed spectrum need to be moved at a cost of \$300 to \$500 million.
- Also, before band clearing occurs, a frequency coordinator is needed to ensure that deployment of coordinatable Unlicensed PCS does not cause interference to microwave licensees.

WHAT IS UNLICENSED PCS?

- Unlicensed PCS is a family of voice and data systems or devices that consumers own or lease to meet their telecommunications needs.
- Unlicensed PCS today includes wireless local area networks, wireless PBXs, advanced cordless phones, personal digital assistants, devices for linking laptop and desktop computers and fixed telemetry.
- Unlicensed PCS in the future will include a host of innovative and exciting new products.
- Unlicensed PCS exhibits a number of unique and valuable attributes:
 1. The customer can purchase or lease the Unlicensed PCS systems or devices from a retail or wholesale outlet.
 2. No service provider is required so that the customer does not incur "airtime" charges for using the system or device.
 3. There is no licensee with exclusive rights to use the spectrum so competition is not restricted and there is open entry for products from any manufacturer complying with FCC rules.
- Unlicensed PCS will be available to all Americans no matter where they work or reside since access to such products is not dependent upon a service provider's decisions whether or not to serve parts of the country.
- Unlicensed PCS affords consumers an important choice in how best to meet their telecommunications needs.

WHAT ARE COORDINATABLE UNLICENSED PCS SYSTEMS AND DEVICES?

- FCC rules require coordinatable devices to incorporate means to prevent activation until installation location is verified and to disable the device if moved outside the coordinated location. In effect, these devices are tied to a fixed infrastructure or base station.
- UTAM is responsible for coordinating the deployment of these systems and devices prior to full band clearing.

- Deployment of coordinatable devices is important to:
 1. Create revenue to fund the relocation process;
 2. Begin market making; and
 3. Introduce the benefits of unlicensed PCS to the public as early as possible.

WHAT ARE THE PUBLIC BENEFITS FROM UNLICENSED PCS?

- Unlicensed PCS products form a cost-effective and flexible extension of the National Information Infrastructure that will ensure affordable and portable telecommunications capabilities.
- There is an enormous public demand for Unlicensed PCS products. The record before the Commission establishes the enormous demand for Unlicensed PCS products.
- There are important business, consumer, education, and health applications for Unlicensed PCS:
 1. Business applications include bringing affordable portability to the factories and offices of the future.
 2. Consumer applications include personal digital assistants and advanced cordless phones that customers can carry with them to receive and transmit data and voice information.
 3. Educational applications include allowing classroom computers to network with databases and other school computers free from expensive and sometimes impossible wiring requirements.
 4. Health care applications include wireless patient monitoring capabilities and systems or devices that allow instant access to lab reports to hospital beds for doctors and nurses.
- New jobs and improved efficiencies will be an outgrowth of Unlicensed PCS capabilities and opportunities.

- Unlicensed PCS systems or devices will ensure continued U.S. technological leadership in the global marketplace with many of these products having particularly important implications for less developed nations.
- Last, but not least, Unlicensed PCS will be available to all Americans when the Unlicensed PCS industry goal of relocating current microwave links from the allocated spectrum is achieved.

WHY DOES UNLICENSED PCS REQUIRE THE FULL 40 MHZ OF SPECTRUM NOW ALLOCATED?

- The FCC allocated 40 MHz of spectrum for Unlicensed PCS:
 1. 20 MHz for voice systems and devices (1890-1900 MHz and 1920 - 1930 MHz)
 2. 20 MHz for data systems and devices (1900 - 1920 MHz)
- Evidence in the record demonstrates that this is the minimum amount of spectrum necessary to satisfy the enormous demand for Unlicensed PCS products.
- Any less spectrum would decrease opportunities for deployment of coordinatable devices and delay band clearing together with the ultimate deployment of nomadic products.

WHY IS THE 1910 - 1930 MHZ ALLOCATION CRITICALLY IMPORTANT FOR UNLICENSED PCS?

- The FCC recognized that all existing 2 GHz microwave licensees must be relocated to permit full deployment of Unlicensed PCS, and therefore the allocation included the 1910 - 1930 MHz frequencies which are relatively lightly populated by microwave licensees. **THIS WAS A CRITICALLY IMPORTANT ACTION BECAUSE ALLOCATION OF ANY OTHER FREQUENCIES WOULD HAVE MADE DEPLOYMENT OF UNLICENSED PCS IMPOSSIBLE.**
- The 1910-1930 band contains only about 450 microwave systems. All other comparable Emerging Technologies bands contain many more. The economics of the industry will not support clearing of those bands.

WHAT WOULD BE THE CONSEQUENCES WERE THE FCC TO MOVE THE UNLICENSED SPECTRUM ALLOCATION TO THE 210 MHZ BAND?

- Relocation of the Unlicensed band to 2100 MHz would make Unlicensed PCS economically unfeasible. There are approximately 2000 microwave licensees in the 1890 - 1930 MHz band, making relocation costs between \$300 - \$500 million. Reallocation to the 2130-2150MHz and 2180-2200 MHz bands would increase the number of microwave systems to be cleared to over 7000 and raise relocation costs to the neighborhood of \$1.05 to \$1.75 billion.
- The costs of clearing this number of microwave users would be prohibitive, both because of the overall increase in costs and the limited number of coordinatable devices that could be deployed, which would reduce revenues available for clearing.

WHAT WOULD BE THE CONSEQUENCES WERE THE FCC TO GRANT APPLE COMPUTER'S PETITION AND ALLOCATE 1910 - 1930 MHZ FOR DATA DEVICES AND SYSTEMS?

- The FCC also sought to ensure equitable deployment of both voice and data Unlicensed PCS by allocating one half of the lightly populated 1910 - 1930 MHz spectrum for data and the other half for voice. THIS WAS CRITICALLY IMPORTANT TO ENSURING THAT BOTH DATA AND VOICE SYSTEMS AND DEVICES CAN BE SUCCESSFULLY DEPLOYED.
- Data Unlicensed PCS was favored with the 20 MHz of contiguous spectrum in the Second Report and Order.
- If the FCC were to grant Apple's petition:
 1. Approximately \$120 - \$130 million in band clearing costs would be shifted from data to voice products.
 2. By eliminating voice products' access to lightly populated spectrum, deployment of coordinatable systems or devices would be delayed or precluded, resulting in reduced sales and clearing fees to fund band clearing.

3. A number of major manufacturers, who are interested in deploying both voice and data PCS devices and have pledged "seed money" to begin the clearing process, have advised UTAM that they would abandon this project as economically unfeasible if the allocation is changed as urged by Apple.
- Apple's assertion that voice products can be readily deployed on a coordinated bases is largely mistaken. Coordination is not possible for all voice devices and requiring coordination even where possible imposes a substantial burden on the market that will inhibit sales.
 - Apple has failed to share with the industry and the FCC a workable plan for band clearing, nor has it offered to undertake that task itself. UTAM still seeks Apple's participation in that process.

WHAT IS THE CURRENT STATUS OF UTAM'S EFFORTS TO EXPEDITE THE DEPLOYMENT OF NOMADIC DATA UNLICENSED PCS PRODUCTS?

- UTAM is looking for means to maximize the revenues available for microwave relocation to expedite band clearing.
- A number of companies have committed substantial funds to kick start that process.
- UTAM also is investigating interim approaches such as guardbands to permit limited non-coordinatable deployment, although UTAM remains committed to full band clearing.

WHAT IS THE STATUS OF UTAM'S PLAN FOR FUNDING AND RELOCATING MICROWAVE FACILITIES FROM THE UNLICENSED PCS SPECTRUM?

- UTAM held its first organizational meeting in December of 1993 and elected a Board of Trustees consisting of representatives of the following companies: AT&T, Ericsson, Motorola, Northern Telecom, Omnipoint, PCSI, Rolm and Sony.
- Four member companies have collectively pledged over \$6 million in "seed money" to fund initial UTAM efforts.
- Expert consulting firms have been retained to assist UTAM:
 1. Goldman Sachs for financing plan review.

2. Business Information Strategies for demand studies.
 3. Comsearch for database services.
- Four major committees have been meeting regularly:
1. Finance Committee to develop funding plan and proposals for the system for manufacturer royalties to be paid into the relocation fund.
 2. Deployment Committee developing coordination procedures and methods for expediting early deployment of non-coordinated systems and devices.
 3. Adjacent Channel and Co-Channel Interference Committee conducting laboratory and on site studies to examine interference potential and coordination procedures as well as the feasibility of guard bands to permit early deployment of non-coordinated systems and devices.
 4. Structure Committee has been developing an organizational plan for UTAM, interviewing candidates for Executive Director, and negotiating for administrative support services.
- The current schedule for UTAM activities is as follows:
- UTAM Members Meeting 4/14/94
 - Board of Trustees Meeting 4/15/94
 - Adjacent Channel Committee Meeting 4/15/94
 - First Draft of FCC Plan 4/15/94
 - Second Draft of FCC Plan 5/26/94
 - Review of Plan by Goldman Sachs 6/22/94
 - Approval of Plan by Membership 7/8/94
 - Submission of Plan to FCC 7/15/94
 - Public comment on UTAM Plan
 - Approval of Plan by FCC
 - Manufacturers begin to deploy coordinatable devices
- A table of contents for the plan is set forth as Attachment 2.

WHAT SHOULD THE FCC DO TO FACILITATE DEPLOYMENT OF UNLICENSED PCS?

- First, the FCC should quickly reaffirm its basic spectrum allocation decisions to provide 40 MHz for Unlicensed PCS. This is the minimum amount of spectrum needed to accommodate industry and consumer needs.
- Second, the FCC should quickly reaffirm the specific allocation of spectrum from 1890 - 1930 MHz for Unlicensed PCS. This is the only suitable home for these systems and devices given the lighter level of microwave links to be relocated than is present in other parts of the Emerging Technologies bands.
- Third, the FCC should quickly reaffirm the allocation of 1890 - 1900 and 1920 - 1930 MHz for voice products and 1900 - 1920 MHz for data products. This is an equitable and balanced approach that evenly divides the lightly populated 1910 - 1930 MHz band between the two Unlicensed PCS sectors.
- Finally, the FCC should establish expedited procedures for reviewing and approving UTAM's plan for funding and managing the relocation of microwave links from the Unlicensed PCS spectrum.

UTAM Board of Trustees

Sandy Abramson (AT&T/NCR)--President
Steve Sivitz (PCSI)--Vice President
Ron Cross (Northern Telecom)--Secretary
Jerome Leonard (Motorola)--Treasurer
Peter Douma (Sony)
Peter Murray (Ericsson)
Peter Kozdon (Rolm)
Brian Stout (Omnipoint)

UTAM Members

Alcatel Network Systems
American Personal Communications
American Association of Railroads
Andrew Corporation
AT&T/NCR
Cellular Holding, Inc.
Columbia Spectrum Management
Ericsson
Gambatte Incorporated
Harris Corporation
Hitachi
LOCATE
Metrocall
Moffett, Larson & Johnson, Inc.
Motorola
NEC America
North American Telecommunications Association
Northern Telecom Inc.
Omnipoint Corporation
Pacific Bell
PCSI
Personal Communications Industry Association
PTI Communications
Rockwell International
ROLM
Sony Corporation of America
SouthWestern Bell
Spectra Link
Sprint
Utilities Telecommunications Council
Wise Communications, Inc.

UTAM FCC PLAN

I. EXECUTIVE SUMMARY

II. IMPORTANCE OF UNLICENSED PCS

A. Importance of Unlicensed PCS

- Consumers
- Productivity
- Jobs
- Global Competitiveness

B. Need for Fund Raising; Band Clearing and Coordination To Deploy Unlicensed PCS

C. Formation of Ad Hoc Committee

D. Report and Recommendations of Ad Hoc Committee to FCC

E. FCC Second Report and Order

- Tentatively designated UTAM as Frequency Coordinator
- Obligations of UTAM to develop and implement financing and relocation plan for band clearing
 - [funding]
 - [clearing]
 - [expeditious asynchronous deployment]
 - [coordination]

F. Issues on Reconsideration

III. DESCRIPTION OF UTAM

A. Members/Board/Officers

B. Charter & Bylaws (attached)

- Membership eligibility
- Voting rights
- Other salient aspects

C. Organization

- Include organizational chart (*e.g.*, Executive Director, Finance Officer)
- Staff
 - set out job descriptions and hiring process
 - describe administrative arrangements
- Committees
 - Finance
 - Deployment
 - Adjacent Channel Interference
 - Other?
- Outside contractors
 - Goldman Sachs
 - BIS
 - Database/Coordinator?

D. Protection of Proprietary Information

- Royalty payments
- Coordination data

IV. FINANCING PLAN

A. Cost Estimates

- Relocation/coordination expenses
- Deployment expenses
- Administrative Expenses
- Credits for advanced payments (White Paper issue)

B. Revenue Sources and Estimates

- Results of market study (BIS study)
 - Types of products
 - Market penetration
 - Market pricing of products by year
 - Year by year sales dollars/royalty expectations
- Methodology to substantiate results
- Amount of spectrum and limitations on growth
- Alternatives considered and rationale for choices
- Financing Plans
 - Royalty payments (White Paper issue)
 - Coordination fees
 - Advance payments (White Paper issue)
 - Need for cost sharing from PCS/MSS licensees
- Method of payment to UTAM
 - procedures for sales reporting/verification

- periodic remittances

V. BAND CLEARING PLAN

A. Principles and Objectives for Band Clearing (White Paper issue)

- Solicitation of proposed principles and objectives
- Rationale for choices and rejection of alternatives

B. Identification of Incumbents

- Need FCC database verification and update (1890-1930 GHz plus adjacent channels)
- Size the problem
 - Numbers to clear
 - Adjacent channel interference concerns

C. Priorities for Clearing (White Paper issue)

- Solicitation of proposed priorities
- Rationale for choices and rejection of alternatives

D. Relocation process

- Notification of incumbents
- Negotiation approach
- Relocation of MW Systems
- Identification and licensing of new frequency
 - coordination with other moves
 - process for assignment of new frequency
 - federal, state and local requirements

- Allocation of construction and related responsibilities between UTAM and licensee as negotiated
- Procurement of equipment and engineering services/payment of costs
- Construction of new facilities
- Dealing with "difficult" links
- Testing of facilities
- One-year prove out period
 - procedures for failure
- Transfer of license to UTAM
 - hot standby
 - process of seeking reimbursement from benefited PCS licensees

E. Timing Expectations for Clearing (White Paper issue)

- Frequency
- Geography
- Exempt Links

F. Satisfaction of Obligation to Expedite Deployment of Nomadic Asynchronous Devices (White Paper issue)

- Funding
- Clearing priorities
- Timing
- Guard bands?
- Other

VI. COORDINATION OF UNLICENSED PCS DEVICES

A. Rationale for Early Deployment

- Meet public needs ASAP
- Necessary to create market/raise funds for band clearing

B. Requirements of Rules

- Definitions of coordinatable
- Location verification before activation
- Relocation disablement pending recoordination
- Labelling requirements

C. Details of Process

- Step-by-step flow charts covering periods (1) from sale to deployment/activation and (2) from relocation to reactivation
- Methodology for determination of interference
 - calculation of power thresholds
 - identification of exclusion zones
 - adjacent channel concerns
 - PCS deployment database—the following information about UPCS deployed devices must be collected:
 - Power
 - Bandwidth
 - Geographic location
 - Vertical height

- How the device is installed
- Number of transceivers
- explain "egg" diagrams (and process attached to each case)
- Location verification procedures
 - FCC Rules
 - Manufacturer must demonstrate compliance
 - FCC determines if showing satisfies rules
 - To assist FCC and manufacturers, UTAM's role may be to develop test suites and options for clearly acceptable approaches
 - but manufacturers not limited to these
 - Precise mechanism left to manufacturer
- Relocation/recoordination procedures
 - FCC Rules
 - Test suites
 - Precise disablement left to manufacturer
- Confidentiality of sales/distribution safeguards

VII. DISPUTE RESOLUTION

A. Types of Disputes

- Failure of relocation negotiations
- Inadequacy of relocated facilities prior to move
- Inadequacy or failure of relocated facilities during one-year test period
- Interference complaints

- Other

B. Process

- Alternative dispute resolution mechanisms
- Escalation
- FCC as last resort

VIII. UTAM WIND UP AND DISSOLUTION

A. Definition of Band Clearing

B. Close Out of Finances

ATTACHMENTS:

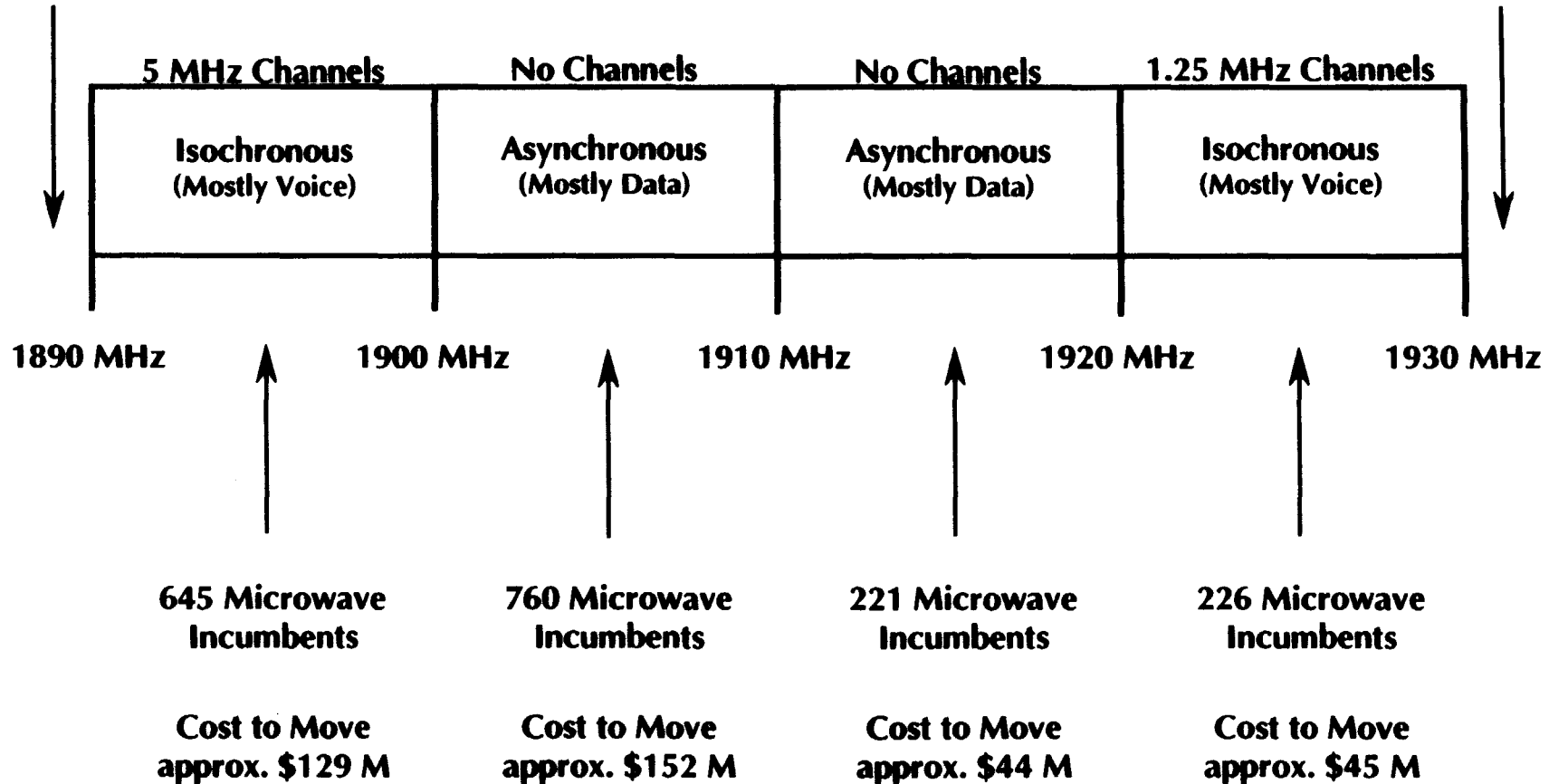
1. Charter
2. ByLaws
3. Glossary
4. Standard Agreements
5. Member Handbook
6. Sales Liaison Package
7. Disablement Test Suite

UNLICENSED SPECTRUM

(40 MHZ OF 160 MHZ PCS spectrum)

Adj. Channel
765 Incumbents
93 at 1880 MHz
Cost = \$134 M

Adj. Channel
655 Incumbents
Cost = \$131 M



Total Cost: \$370 M
Total Cost with Adjacent Channels: \$635 M

1880-1889.99

1890-1899.99

1900-1909.99

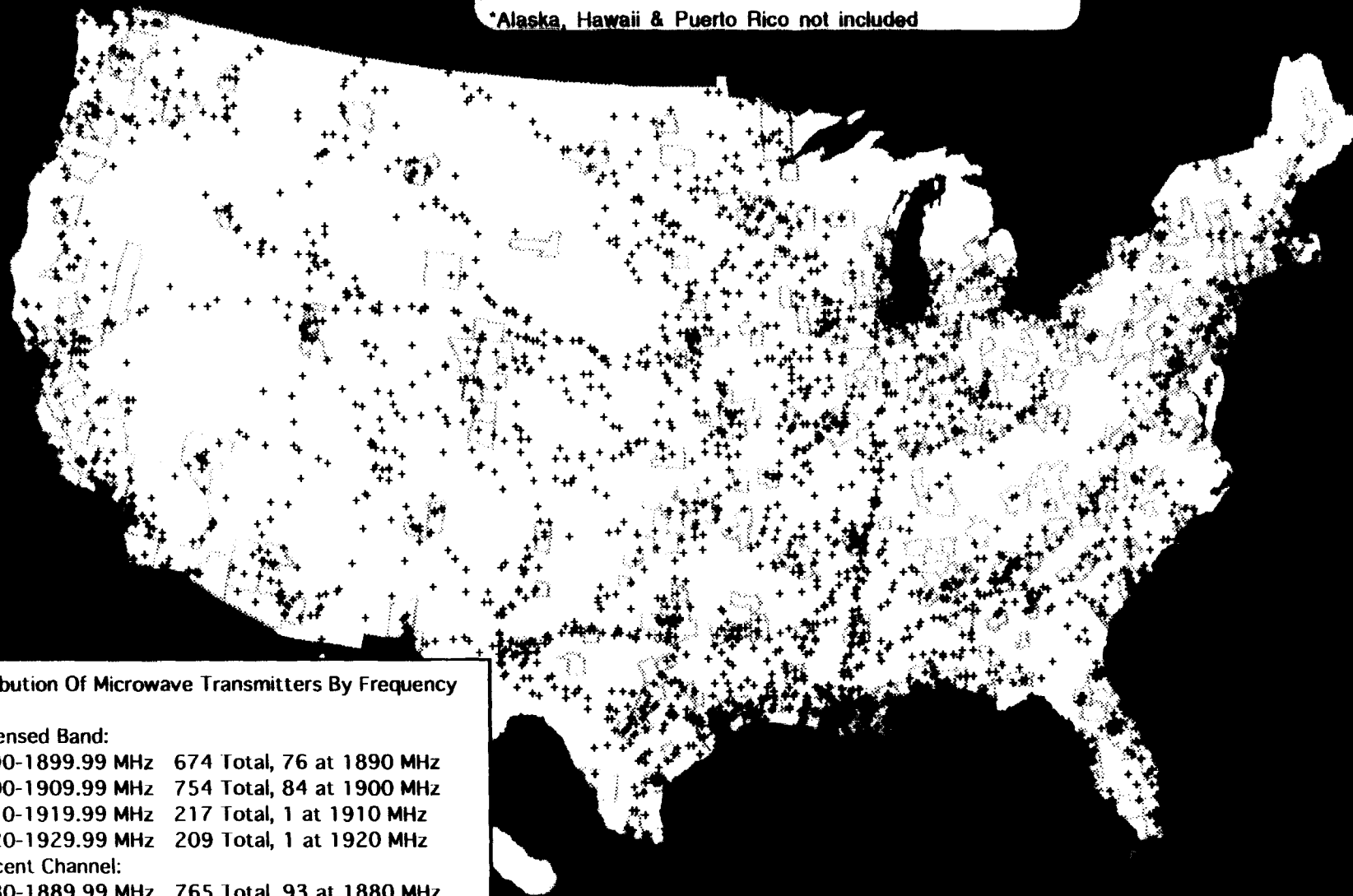
1910-1919.99

1920-1929.99

1930-1939.99

Continental* 48 States
1850-1990 Mhz Transmitters (9226 total)

*Alaska, Hawaii & Puerto Rico not included



Distribution Of Microwave Transmitters By Frequency

Unlicensed Band:

1890-1899.99 MHz 674 Total, 76 at 1890 MHz
1900-1909.99 MHz 754 Total, 84 at 1900 MHz
1910-1919.99 MHz 217 Total, 1 at 1910 MHz
1920-1929.99 MHz 209 Total, 1 at 1920 MHz

Adjacent Channel:

1880-1889.99 MHz 765 Total, 93 at 1880 MHz
1930-1939.99 MHz 655 Total, 1 at 1930 MHz and
1 at 1931.8125 MHz

NOTE: This is transmitters only and it must be assumed
an opposing transmitter exists for a duplex link.

UTAM, Inc.